high, the boron containing layer 4 can be made thin. Particularly, provided the concentration of the isotope ^{10}B in the boron containing layer 4 is set to fall within about $10^{20}/cm^3$ to $10^{23}/cm^3$, and more preferably provided the upper limit of the concentration is set to $10^{22}/cm^3$ or less, the neutron and ^{10}B are securely brought into reaction to effectively emit α rays.--

IN THE CLAIMS:

Please cancel claims 1 and 2.

Please amend claims 3-5 as follows:

3. (Amended) A semiconductor device for detecting neutrons comprising:

a semiconductor substrate;

a boron containing layer containing isotope ^{10}B, the layer being formed on said semiconductor substrate;

a PN junction formed on a surface area of said semiconductor substrate below said boron containing layer; wherein

electron - positive hole pairs are generated in a depletion layer of said PN junction by α rays generated by a reaction between said neutrons and said isotope ^{10}B, and the neutrons are detected on the basis of the quantity of electric charge of the electron - positive hole pairs; and

an analyzing circuit portion including a predetermined semiconductor element to estimate an energy spectrum of the α rays on said semiconductor substrate in a region other than the region where said neutrons are detected.

4. (Amended) A semiconductor device for detecting neutrons comprising:

a semiconductor substrate;

a boron containing layer containing isotope ^{10}B, the layer being formed on said semiconductor substrate;

a PN junction formed on a surface area of said semiconductor substrate below said boron containing layer; wherein

electron - positive hole pairs are generated in a depletion layer of said PN junction by α rays generated by a reaction between said neutrons and said isotope ^{10}B, and the neutrons are detected on the basis of the quantity of electric charge of the electron - positive hole pairs; and

an analyzing circuit portion including a predetermined semiconductor element on said semiconductor substrate in a region other than the region where said neutrons are detected, wherein the concentration of said isotope ^{10}B in said boron containing layer in said analyzing circuit portion is lower than that of said isotope ^{10}B of said boron containing layer in the region where said neutrons are detected.

5. (Amended) A semiconductor device for detecting neutrons comprising:

a semiconductor substrate;

a boron containing layer containing isotope ^{10}B, the layer being formed on said semiconductor substrate;

a PN junction formed on a surface area of said semiconductor substrate below said boron containing layer; wherein

electron - positive hole pairs are generated in a depletion layer of said PN junction by α rays generated by a reaction between said neutrons and said isotope ^{10}B, and the neutrons are detected on the basis of the quantity of electric charge of the electron - positive hole pairs; and